

censis. The thigh is shorter than the leg, while both are smaller than in the species named. The foot is shorter, while the tail is slightly longer.

Atalapha is the most aberrant of any of the genera of the *Vespertilionidæ*, as this family is at present defined. It presents features in common with the *Emballonuridæ*, the *Molossi* and the *Phyllostomidæ*. These remarks are appropriate at this place, since in *A. teliotis* the general plan of the ear is as in *Emballonuridæ*; the shape of the wing, especially as to the strength of the first metacarpal bone, the shortness of the fifth metacarpal bone as compared to others of its series, the rigidity of the phalanges of the fifth digit, the arrangement of the lines in the fourth interdigital space, the flexibility of the lips, the great height of the internal tuberosity and of the length of the epicondyle of the humerus, the reverted distal ulnar rudiment, the posterior deviation of the coracoid process, the presence of a distinct lateral lobe to the cerebellum, the number of the upper incisors (being restricted to two), and the general shape of the wing are as in *Molossi*; while the complete tympanic bone (forming a ring at the upper margin), the pisiform bone being palmar and articulating with the fifth metacarpal bone, the palmar distinctness of the metacarpal bones, the shapes and relative proportions of the ectoturbinals, the presence of numerous vertical raised muscle-bands on the endopatagium, the angle of the lower jaw not being deflected, but remaining in axial line with that of the horizontal ramus, the genus resemble the true *Phyllostomidæ*.

Notes on Hebrew Phonetics. By J. Cheston Morris, A.M., M.D.

(Read before the American Philosophical Society, March 6, 1891.)

It might seem extremely rash for one whose acquaintance with Hebrew scarcely extends to a knowledge of its letters to offer any observations upon them in the presence of those who have made an exhaustive study of the subject; yet I do so, as thinking that one who occupies "the room of the unlearned," and is looking at the matter from a distance rather than from the dust-observed atmosphere of the conflict of opinions, may offer some hints which may prove of value, even though they may not be wholly new.

In commencing the study of Hebrew characters, one is struck with two facts: 1. That there is said to be no character representing a pure vowel sound. This, I believe, is not the case with any other known alphabet. 2. That a change was made during the Babylonian captivity of the Jews, substituting the present square characters for the more ancient form. Let us inquire, first, why this was probably done. At this time the sacred records were subjected to inspection of their conquerors, containing, as they certainly did, many things which would be more or less offensive to them, and calculated to cast ridicule if not bring persecution upon the ex-

files. What more natural than for those who had charge of these records to endeavor to conceal their contents by such a veil as opportunity afforded, viz., that the ancient phonetic value of the letters had been lost and the meaning of the words so obscured that only those initiated by long study of the Jewish sacred mysteries and traditions could read them? In this way we have accounted for the rise of the school of the Talmudists, the study of the Mishna and Gemara, and the origin of the Kabbala. No word was to be pronounced as written; it had an inscrutable meaning only to be learned by the initiated and transmitted by the use of points added to the letters. Add to this the inherent difficulty of representing the sounds of any people in the vocabulary of another race; as instances of this, take the substitution of "l" for "r" by the Chinese in learning English, or the difficulty a Frenchman or German has in acquiring our "th," or the Greek *theta*; or, as more to the point, the substitution by the uneducated German Jew of "sh" for pure "s." There is something in the physical structure of the vocal organs of each race which is reflected in the vocables used by it. In the Hebrew race as met with to-day this ringing nasal character strikes us all forcibly.

After these introductory thoughts, we are struck with the fact that one of their Hebrew letters, the *yod*, *ngain*, is so variously pronounced as to make one seriously question its true phonetic value. Its place in the order of the alphabet, as compared with the Phœnician and Greek, is that of the Greek *omicron*; its form in Phœnician and in the old Samaritan is o. In many Hebrew dictionaries this value is given it. Take, again, the *vau*, its place that of the Greek *F*, *digamma*, its phonetic value that of the Latin *v*, or English *ou*. May not our double *u*, *w*, represent this, as well as the German *v*, *fow*? The sound of *quof*, is lost to Western languages, except so far as represented by *q*, to which we add a *u* to make it vocable to us. The letters *samech*, and *shin*, are represented by the Greek *sigma*, and *xi*, but are found in an inverted order in the alphabet. [The confusion between these letters goes back to a far earlier period when we find two of the Hebrew tribes disputing over Shibboleth or Sibboleth.]

But the very first letter is a vocable which in all other alphabets is considered a pure vowel sound, *a*; the fifth, *he*, is another, *ë*; the sixth, *chayt*, is *ë*, or *ch*; the tenth, *yod*, is *i*, *iota*; and, as above, *vau* = *ou*, or *u* (or sometimes *f* or *v*), and *ngain* = *o*. We have thus all our usual vowel sounds except *y*, which we know in French as *ygre*, and substitute usually for the Greek *upsilon*. In Hebrew we have two sibilants, *zain* and *tsaddi*, the latter of which occupies the alphabetical position in Greek of *upsilon*. If we now try to substitute in Hebrew, as ordinarily written, the above values for the letters, we shall find we have a perfectly vocable language. The names of men and places are given not very differently from our modern pronunciation of them as elucidated by the pointed Hebrew, when allowance is made for the difference due, as above stated, to racial intonation.

In some instances, two or three consonants are found together, but these may be regarded as familiar abbreviations for well-known words, just as D. L. W. means for us Delaware, Lackawanna and Western R. R., etc. In this way we may find that the Hebrew is really no exception as regards the presence of characters indicating pure vowel sounds; and, indeed, we have the authority of Josephus for the statement that it does. Chief among the words whose pronunciation was to be hidden was the name of the Deity—it was forbidden—and many, long, and bitter have been the controversies as to the true pronunciation of יהוה, *yod, hay, vau, huy*. Josephus says it was composed of four vowels.* He was a priest, and also well versed in Greek and Roman literature, and we may well accept his statement as reflecting the best learning of his times on Jewish matters. It seems to me that this ought to settle the question.

As to the consequences which would follow from such a view, I must leave them to those more competent to follow them out. It seems, however, to me that we would thus have better opportunities of comparing the Hebrew sacred records with those of all other ancient nations, and of clearing up much obscurity in ancient history and geography.

I would therefore suggest the following phonetic values:

א	= α = a	ל	= λ = l
ב	= β = b	מ.ס final	= μ = m
ג	= γ = g	ן final	= ν = n
ד	= δ = d	ס	= σ = s
ה	= ε = ě	ע	= ο = o
ו	= ρ = f or vow or ou or u	פ.ף final	= π = p
ז	= ζ = z	ץ.ץ final	= ς = y
ח	= η = ě or χ = ch?	ק	= ρ = q
ט	= θ = th	ר	= ρ = r
י	= ι = i	ש	= ξ = x
כ.ך final	= κ = k	ת	= τ = t

And illustrate by

AN ATTEMPTED TRANSLITERATION OF GENESIS X.

1. v ale tuldt bni-nē^{ch} xm em v ipt v iuldu lem bnim aēr embul^{ch}
Noah Shem Ham Japheth
2. bni ipt gmr v mgug v mđi v iun v tbi v mxk v tirs^v
Japheth Gomer Magog Madai Javan Tubal Meschech Tiras

* See Josephus, "Wars of the Jews," Book v, Ch. v, 7.

3. v bni gmer axknz v ript v tgrme
Gomer Ashkenaz Riphath Togarmah
4. v bni iun alixe v trxix ktim v ddnim
Javan Elisha Tarshish Kittim Dodanim
5. male nprdu aii eguim barytm aix llxnu lmxpēt^{ch}tm bguiem
6. v bni ēm^{ch} kux v myrīm^{z?} v puth v knon
Ham Cush Mizraim Phut Canaan
7. v bni kux sba v ēvile v sble v rome v sbtka v bni rome xba v ldn
Cush Sheba Havilah Sabtah Raamah Sabtechah Raamah Sheba Dedan
8. v kux ild at-nmrd^{ch} eva eēl leiu^{ch} gbr bary
Cush Nimrod
9. eva-eie gbr-yid lpm ieve ol-kn iamr knmrd gbur yid lpm ieve
Jehovah Nimrod Jehovah
10. v tei iaxit mmlktu bbl v ark v akd v klne bary xnor
Babel Erech Accad Calneh Shinar
11. mn-eary eeva iya axur v ibn at-ninve v at-rēbt oir v at-klē^{ch}
Asshur Nineveh Rehoboth Calah
12. v at-rsn bin ninve v bin klē^{ch} eva eoīr egdle
Resen Nineveh Calah
13. v myrim ild at-ludim v at-onmim v at-lebim v at-nptēim^{ch}
Mizraim Ludim Anamim Lehabim Naphtuhim
14. v at-ptrsim v at-kslēm^{ch} axr iyav mxm plxtim v at-kp̄trim
Pathrusim Casulhim Philistim Captorim
15. v knon ild at-vidn bkru v at-ēt^{z?}
Canaan Sidon Heth
16. v at-eibusi v at-camri v at-egr̄xi^{ch}
Jebusite Amorite Girschite
17. v at-eēvi^{ch} v at-eorqi v at-ēsini^{ch}
Hivite Arkite Sinite
18. v at-earudi v ut-eymri v at-eēm̄ti^{ch} v nēr n̄pyu m̄xpēt^{ch} eknoni^{ch}
Arvadite Zemarite Hamathite Canaanites
19. v iei gbuleknoni m̄yidn^z bake grre od-oze bake sdme v omre v adme
Canaanite Sidon Gerar Gaza Sodom Gomorrah Admah
v ybim od-lxo
Zeboim Lasha
20. ale bni-ēm lmxpēt^{ch}tm llxntm barytm bgviem
Ham
21. v lxm ild gm-eva abi kl-bni obr aēi ipt egdul
Shem Eber Japheth
22. bni xm oilm v axur v arpkxd v lud v arm
Shem Elam Asshur Arphaxad Lud Aram
23. v bni arm ony v ēul^{ch} v gtr v m̄x
Aram Uz Hul Gether Mash
24. v arpkxd ild at-xlē^{ch} v xlē^{ch} ild ut-obr
Arphaxad Salah Salah Eber

25. v^{ch}l obr ild xni bnim xm eaēd plg ki biniv nplge cary v xm aēiv iqtln
 Eber Peleg Peleg Joktan
26. v iqtln ild at-almudd v at-xlp v at-evrmut v at-irē^{ch}
 Joktan Almodad Sheleph Hazarmaveth Jerah
27. v at-edurm v at-auzl v at-dqle
 Hadoram Uzal Diklah
28. v at-oubl v at-abimal v at-xba
 Obal Abimael Sheba
29. v at-aupr v at-ēvile v at-iubb kl-ale bni iqtln^{ch}
 Ophir Havilah Jobab Joktan
30. v i-i maxbm m-mxa bake spre er eqdm
 Mesha Sephar
31. ale bni-xm lmxpēt^{ch}m llxgtm barytm lguiem
 Shem
32. ale mxpēt bni-nē^{ch} ltuldtm bguiem umale nprdu eguim bary aēr embul^{ch}
 Noah

ALSO OF JUDGES XII, 6.

v iamru lu amr-na xblt v iamr sblt v la ikin l dbr bn v iaēzu autu v ix-^{ch}
 Shibboleth Sibboleth
 ethuēu al mobrut eirden v ipl bot ceia maprim arboim v xnim alp.

On the Grapeville Gas-wells. By J. P. Lesley.

(*Read before the American Philosophical Society, March 6, 1891.*)

Mr. John Fulton, General Manager of the Cambria Iron Works, at Johnstown, Cambria county, Pa., has kindly furnished me with the following particulars of one of the most important and significant episodes in the strange story of Petroleum in Pennsylvania :

1. A report to him made October 12, 1888, by Edgar G. Tuttle, then Mining Engineer of the Company. This gives :—(a) the number of wells (27 or more) around Grapeville, in Westmoreland county, up to that date sunk and piped by different companies ;—(b) the length and sizes of the pipe line to Johnstown ;—(c) the pressures of gas at the well, at the 4th, 8th, 12th, 16th, 20th, 24th, 28th, 32d, 36th and 39th mile, and at the Cambria Works terminus.

2. A second report made to him two years later, February 25, 1891, by M. G. Moore, now Mining Engineer of the Company. This gives :—(a) the titles of eleven companies owning 85 gas-wells in the Grapeville district ;—(b) an account of the drilling especially of the Agnew well ;—(c) a table showing the decline of pressure at the Westmoreland and Cambria Companies' wells, from 386 lbs. on April 29, 1889, to 65 lbs. on February 2, 1891 ;—(d) a full table of the Co.'s thirteen wells, depths, dates of striking gas, the initial pressure of each, subsequently observed pressure at April 29, 1889, December 15, May 26, November 3, December 1, 1890,